Vincotech

B0-EP12NAA004MS-PS38F78T

target datasheet

***flow*ANPC E3 SiC** **1200 V / 4,25 mΩ**

Topology features

- Advanced Neutral Point Clamped topology
- IGBT
- Kelvin Emitter for improved switching performance
- MOSFET
- Temperature sensor

Component features

- High Blocking Voltage with low drain source on state resistance
- High speed SiC-MOSFET technology
- Resistant to Latch-up

Housing features

- Base isolation: Al_2O_3
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

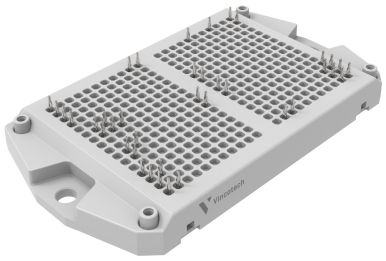
Target applications

- Energy Storage Systems
- Solar Inverters

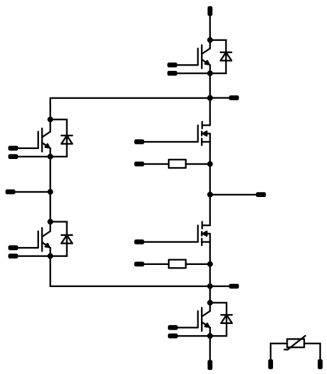
Types

- B0-EP12NAA004MS-PS38F78T

flow E3 12 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
AC Switch				
Drain-source voltage	V_{DSS}		1200	V
Drain current (DC current)	I_D	T_j = T_{jmax} T_s = 80 °C	427	A
Peak drain current	I_{DM}	t_p limited by T_{jmax}	1136	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	272	W
Gate-source voltage	V_{GSS}	static	-5 / 18	V
		dynamic	-10 / 22	V
Maximum Junction Temperature	T_{jmax}		175	°C
Neutral Point Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	T_j = T_{jmax} T_s = 80 °C	97	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	200	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	175	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}		175	°C
DC-Link Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	T_j = T_{jmax} T_s = 80 °C	131	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	217	W
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
DC-Link Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	T_j = T_{jmax} T_s = 80 °C	172	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	400	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	289	W
Gate-emitter voltage	V_{GES}		±20	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V, V_{CC} = 800 V T_j = 150 °C	9,5	µs
Maximum junction temperature	T_{jmax}		175	°C
Neutral Point Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	T_j = T_{jmax} T_s = 80 °C	75	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	200	A
Total power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	132	W
Maximum junction temperature	T_{jmax}		175	°C
Resistor (Sense)				
DC current	I	terminal temperature Tk = 90 C°	1264	mA
Power dissipation	P_{tot}	T_j = T_{jmax} T_s = 80 °C	0,4	W
Operation Temperature	T_{op}		-55 ... 155	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Module Properties				
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…+(T_{jmax} - 25)	°C
Isolation Properties				
Isolation voltage	V_{isol}	DC Test Voltage t_p = 2 s	6800	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 600	

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
AC Switch										
Static										
Drain-source on-state resistance	$r_{DS(on)}$		18		284	25		4,25	6,25	mΩ
Gate-source threshold voltage	$V_{GS(th)}$				0,0284	25	1,7	2,25	2,75	V
Gate to Source Leakage Current	I_{GSS}		22	0		25			400	nA
Zero Gate Voltage Drain Current	I_{DSS}		0	1200		25			40	µA
Internal gate resistance	r_g							0,25		Ω
Gate charge	Q_g		-5/18	800	284	25		752		nC
Short-circuit input capacitance	C_{iss}	f = 500 kHz	0	800	0	25		18720		pF
Short-circuit output capacitance	C_{oss}							940		
Reverse transfer capacitance	C_{rss}							32		
Diode forward voltage	V_{SD}		0		284	25		4,1		V
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,35		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Neutral Point Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,01	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		100	25 150		1,55 1,8	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			100	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							21000		pF
Output capacitance	C_{oes}		0	10		25		700		pF
Reverse transfer capacitance	C_{res}							280		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		100	25		700		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,54		K/W
DC-Link Diode										
Static										
Forward voltage	V_F				200	25 125 150		1,65 1,65 1,65	2,1	V
Reverse leakage current	I_R	V_r = 1200 V				25			80	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,44		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
DC-Link Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			10	0,02	25	5,4	6	6,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 150		1,55 1,8	1,85	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}							42000		pF
Output capacitance	C_{oes}		0	10		25		1400		pF
Reverse transfer capacitance	C_{res}							560		pF
Gate charge	Q_g	V_{CC} = 600 V	0/15		200	25		1400		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,33		K/W
Neutral Point Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,65 1,65 1,65	2,1	V
Reverse leakage current	I_R	V_r = 1200 V				25			40	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,72		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Resistor (Sense)										
Static										
Resistance	R							0,25		Ω
Tolerance							-1		1	%
Temperature coeficient	tc							200		ppm/K
Thermistor										
Static										
Rated resistance	R					25		5		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 499 Ω				100	3,2		3,3	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,3		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3380		K
Vincotech Thermistor Reference									V	

Ordering Code

Version	Ordering Code
Without thermal paste	B0-EP12NAA004MS-PS38F78T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-EP12NAA004MS-PS38F78T-/7/

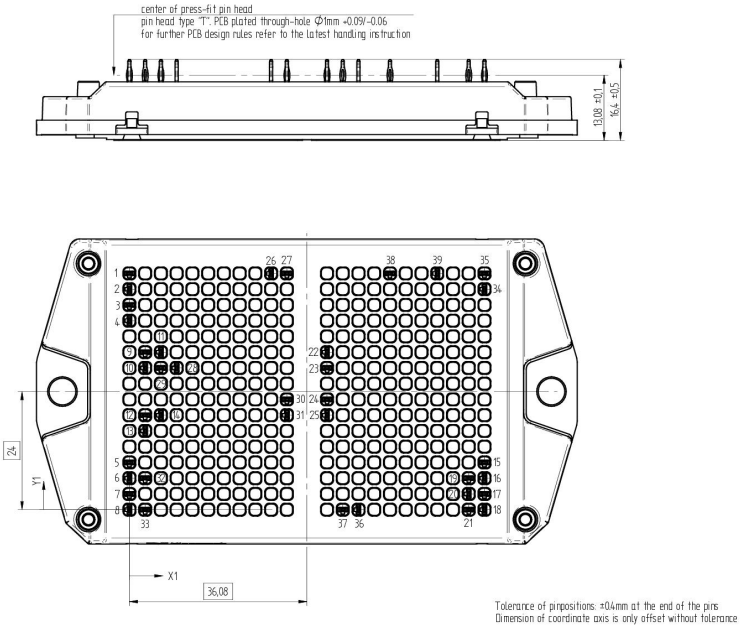
Marking

	Name		Date code	UL & VIN	Lot	Serial
Text	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
	TTTTTTVV	LLLLL	SSSS	WWYY		

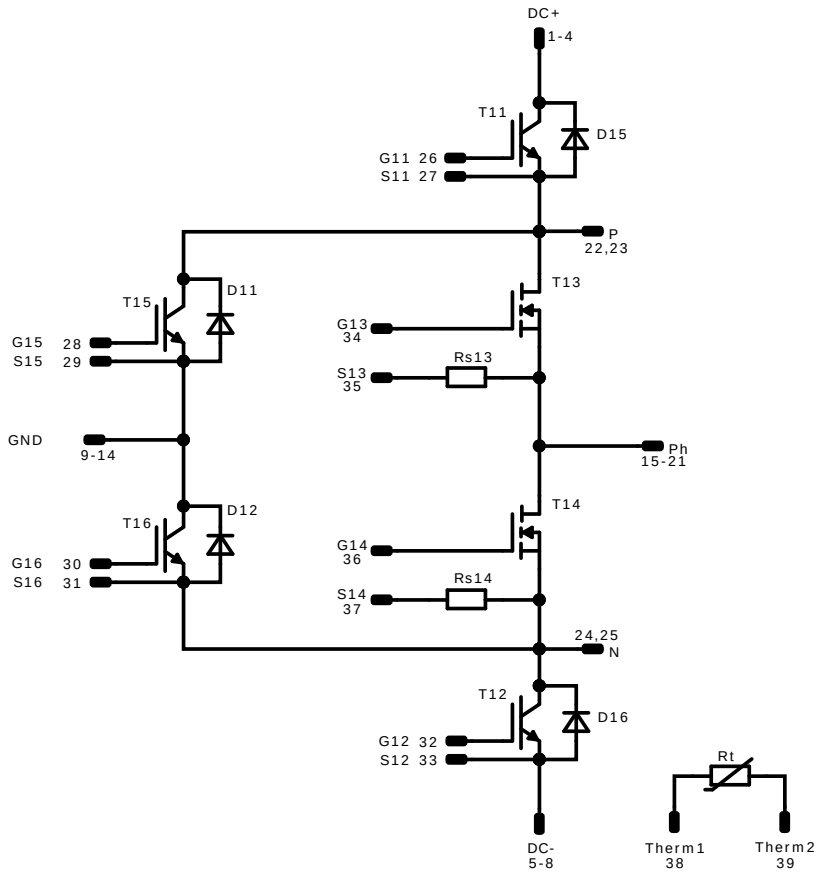
Outline

Pin table [mm]

Pin	X	Y	Function
1	0	48	DC+
2	0	44,8	DC+
3	0	41,6	DC+
4	0	38,4	DC+
5	0	9,6	DC-
6	0	6,4	DC-
7	0	3,2	DC-
8	0	0	DC-
9	3,2	32	GND
10	3,2	28,8	GND
11	6,4	32	GND
12	3,2	19,2	GND
13	3,2	16	GND
14	6,4	19,2	GND
15	72,16	9,6	Ph
16	72,16	6,4	Ph
17	72,16	3,2	Ph
18	72,16	0	Ph
19	68,96	6,4	Ph
20	68,96	3,2	Ph
21	68,96	0	Ph
22	40,16	32	P
23	40,16	28,8	P
24	40,16	22,4	N
25	40,16	19,2	N
26	28,8	48	G11
27	32	48	S11
28	9,6	28,8	G15
29	6,4	28,8	S15
30	32	22,4	G16
31	32	19,2	S16
32	3,2	6,4	G12
33	3,2	0	S12
34	72,16	44,8	G13
35	72,16	48	S13
36	46,56	0	G14
37	43,36	0	S14
38	52,96	48	Therm1
39	62,56	48	Therm2



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T13, T14	MOSFET	1200 V	4,25 mΩ	AC Switch	
T15, T16	IGBT	1200 V	100 A	Neutral Point Switch	
D15, D16	FWD	1200 V	200 A	DC-Link Diode	
T11, T12	IGBT	1200 V	200 A	DC-Link Switch	
D11, D12	FWD	1200 V	100 A	Neutral Point Diode	
Rs13, Rs14	Resistor			Resistor (Sense)	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 40	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* E3 packages see vincotech.com website.

Package data
Package data for *flow* E3 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=150°C and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
B0-EP12NAA004MS-PS38F78T-T1-14	11 Jul. 2025	Initial Release	

Product status definition		
Datasheet Status	**Product Status**	**Definition**
Target	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice. The data contained is exclusively intended for technically trained staff.